Kuldeep Purohit

Image Processing and Computer Vision lab
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RESEARCH INTEREST

Broad Areas: Image Processing, Computer Vision and Deep Learning.
Recent Work: Designed efficient models for restoration of images and videos suffering from blur, low-resolution, haze and noise and utilized them for scene segmentation or estimation of 3D geometry and motion.

EDUCATION

Indian Institute of Technology Madras, Chennai, India January 2014 - present
MS+PhD in Image Processing and Computer Vision
Research Advisor: Prof. A.N.Rajagopalan
CGPA 8.43

Indian Institute of Technology Mandi, Himachal Pradesh, India 2009 - 2013
Bachelor of Technology in Electrical Engineering

WORK EXPERIENCE

Research Intern December 2016 - May 2017
KLA-Tencor Corporation
Worked with E-Beam Wafer Inspection Team to design domain-specific models for SEM image enhancement and photo-metric stereo.

Research and Teaching Assistant January 2014 - Present
Indian Institute of Technology Madras, Chennai, India
Carry out research at Image Processing and Computer Vision Lab, handle teaching responsibilities under Department of Electrical Engineering.

Intern December 2011 - January 2012
Center for Artificial Intelligence and Robotics, Defense Research and Development Organization, India
Worked with Computer Vision Group on algorithms for vehicle tracking in UAV Imagery.

Project Assistant May 2012 - June 2012
National Institute of Technology Bhopal, India
Literature review on Nano-materials and molecular electronics.

PUBLICATIONS

1. *Kuldeep Purohit*, Anshul B. Shah, and A.N. Rajagopalan, "Bringing Alive Blurred Moments," Accepted at International Conference on Computer Vision and Pattern Recognition (**CVPR**), 2019.
2. *Kuldeep Purohit*, Srimanta Mandal, and A.N. Rajagopalan, "Mixed-Dense Connection Networks for Image and Video Super-Resolution," Accepted at **Neurocomputing Journal**, 2019.
3. *Kuldeep Purohit*, Srimanta Mandal, and A.N. Rajagopalan, "Multi-level Weighted Enhancement for Underwater Image Dehazing," Accepted at Journal of the Optical Society of America A (**JOSA-A**), 2019.
4. *Kuldeep Purohit* and A.N. Rajagopalan, "Efficient Motion Deblurring with Feature Transformation and Spatial Attention," Accepted at International Conference on Image Processing (**ICIP**), 2019.

5. *Kuldeep Purohit*, Srimanta Mandal, and A.N. Rajagopalan, "Scale-Recurrent Multi-residual Dense Network for Image Super-Resolution," In the European Conference on Computer Vision (**ECCV**) Workshop on Perceptual Image Restoration and Manipulation, 2018.
6. Srimanta Mandal, *Kuldeep Purohit*, A.N. Rajagopalan, "Color Image Super Resolution in Real Noise," In ACM Indian Conference on Computer Vision, Graphics and Image Processing (**ICVGIP**), December 2018.
7. *Kuldeep Purohit*, Anshul B. Shah, and A.N. Rajagopalan, "Learning based Blur Detection and Segmentation," In International Conference on Image Processing (**ICIP**), September 2018.
8. *Kuldeep Purohit*, Subeesh Vasu, A.N. Rajagopalan, Bala Naga Jyothi and Raju Ramesh, "Mosaicing Deep Underwater Imagery," In ACM Indian Conference on Computer Vision, Graphics and Image Processing (**ICVGIP**), December 2016.
9. *Kuldeep Purohit* and A.N. Rajagopalan, "Splicing Localization in Motion Blurred 3D Scenes," In International Conference on Image Processing (**ICIP**), September 2016.

Manuscripts Under Review

1. *Kuldeep Purohit* and A.N. Rajagopalan, "Spatially Adaptive Residual Networks for Efficient Image and Video Deblurring". (submitted to **ICCV**), 2019.
2. *Kuldeep Purohit*, Subeesh Vasu, Poornachandra Rao and A.N. Rajagopalan, "Planar geometry and latent scene recovery from a single motion blurred image".

SCHOLASTIC ACHIEVEMENTS

- Received **travel grant from Google Research** to present my work at the Conference on Computer Vision and Pattern Recognition (**CVPR**), 2019, California, USA.
- Winner of the Image Colorization Challenge in **NTIRE**: New Trends in Image Restoration and Enhancement, CVPR 2019.
- Finalist in the Video deblurring and Video Super-resolution Challenges in **NTIRE**: New Trends in Image Restoration and Enhancement, CVPR 2019.
- Finalist in all three tracks of the Super-resolution Challenge in **PIRM**: Perceptual Image Restoration and Manipulation, ECCV 2018.
- Our work was selected for the **Best Paper Award** (Runner Up) at the Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) 2018.
- Our team was selected to compete in the Annual Intelligent Ground Vehicle Competition **(IGVC 2017), Michigan, USA**.
- Ranked 13^{th} among 4000 teams in the **Hackerearth** Deep Learning Challenge on Image Classification 2017.
- Received **travel grant** from IIT Madras to present my work at the International Conference on Image Processing (ICIP) 2016, Arizona, USA.
- **Scholarship** for under-graduate studies offered by Government of India, Ministry of Human Resource Development (2009-2011).

PROFESSIONAL SERVICES

Reviewer for:

- IEEE Transactions on Multimedia
- Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) 2018
- International Conference on Signal Processing and Communications (SPCOM) 2018.
- National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG) 2017
- International Conference on Advances in Pattern Recognition (ICAPR) 2017
- National Conference on Communications (NCC) 2017.

TEACHING EXPERIENCE

Assisted in deciding course contents, conducting lectures and evaluating tutorials and programming assignments for the following courses:

- *Deep Learning for Imaging* under Prof. A.N. Rajagopalan and Prof. Kaushik Mitra
- *Advanced Topics in Networks* under Prof. Avhishek Chatterjee
- *Image Signal Processing* under Prof. A.N. Rajagopalan
- *Introduction to Electrical Engineering* under Prof. A.N. Rajagopalan

SKILLS

Programming: Python, MATLAB, Latex, C/C++ (familiar), Lua (familiar)
Libraries: PyTorch ,Tensorflow, Torch, MatConvNet, OpenCV

RECENT COURSEWORK

- Image Signal Processing
- Digital Video Processing
- Digital Signal Processing
- Applied Linear Algebra
- Deep Learning
- Machine Learning for Computer Vision
- Fundamentals of Linear Optimization
- Probability Foundations

CONFERENCES AND WORKSHOPS ATTENDED

Conferences:

- **ICIP** 2016, **ICVGIP** 2016, **NCC** 2016, **ICVGIP** 2014.

Workshops:

- *Workshop on Computational Brain Research* by Center for Computational Brain Research (CCBR), IIT Madras (2018).
- *Summer School on Deep Learning for Computer Vision* organized by CVIT, IIIT Hyderabad (2017).
- *Human Computer Interface* organized by Dr. Pradipta Biswas at IIT Mandi (2012).
- *Swarm Robotics* organized by Robosoft Systems Inc., IIT Bombay (2010).

NATIONAL/ INTERNATIONAL TESTS

- **GATE:** 99.7 percentile in Graduate Aptitude Test in Engineering 2016: Post-graduate entrance exam of Indian Engineering Universities ($\approx 150,000$ participants.)
- **GRE:** 320/340 (Quantitative: 168/170) (2012)
- **TOEFL:** 98/120 (2012)
- **IIT-JEE:** 99.0 percentile in Indian Institute of Technlogy- Joint Entrance Examination 2009: Under-graduate entrance exam for IITs ($\approx 400,000$ participants.)

REFERENCES

Prof. A.N. Rajagopalan
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Department of Electrical Engineering
Indian Institute of Technology Madras

Prof. Kaushik Mitra
Assistant Professor
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